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(71) Applicant
William Sydney
Charlton
30 Verbena Way
Worle
Weston-Super-Mare
Avon
(72) Inventor
William Sydney
Charlton
(74) Agent and/or Address for
Service
Haseltine Lake and Co
Hazlitt House
28 Southampton
Buildings
Chancery Lane
London WC2A 1AT

(54) Oil filters

(57) An oil filter comprises a casing (2) and an end cap (4) which are made of thermoplastics material (nylon) and are welded together (6) to form a housing within which a filter element (12) and other components are disposed. The filter also incorporates an integral hexagonal section (24) which incorporates a pressure switch enabling remote indication of filter clogging. Section (24) enables a spanner to be used to unscrew the filter from an engine but not to screw it on to the engine.

FIG. 1.

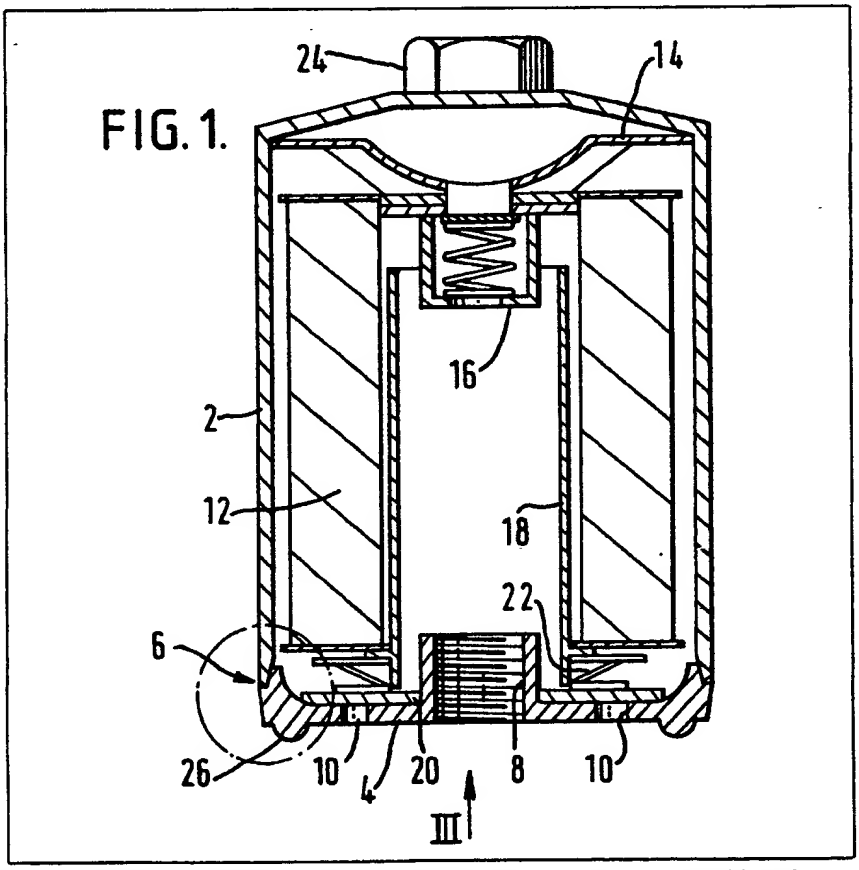

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FIG. 1.

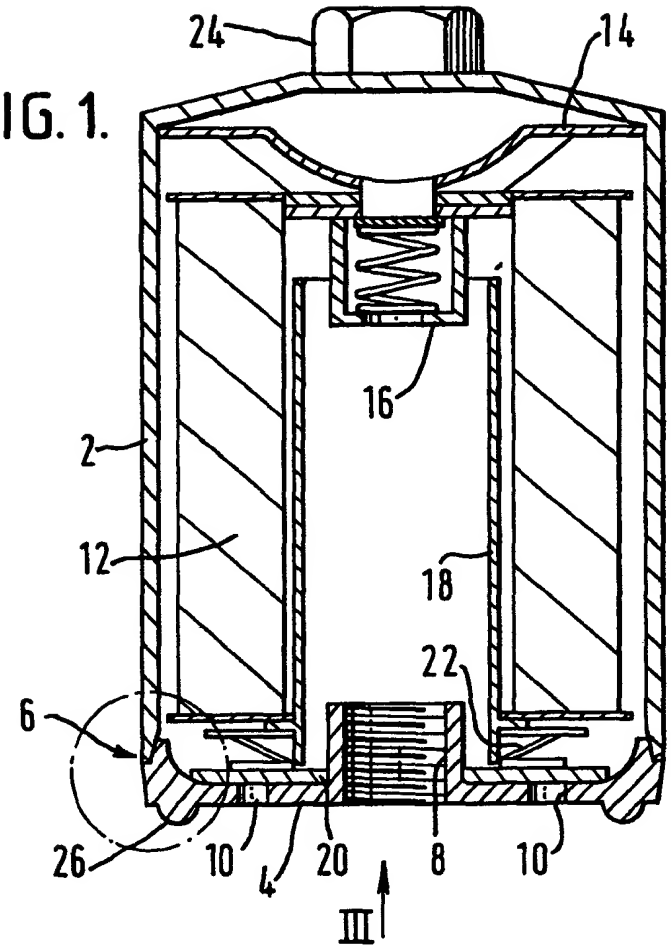


FIG. 2.

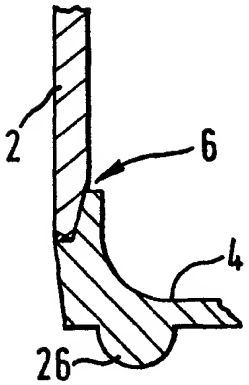
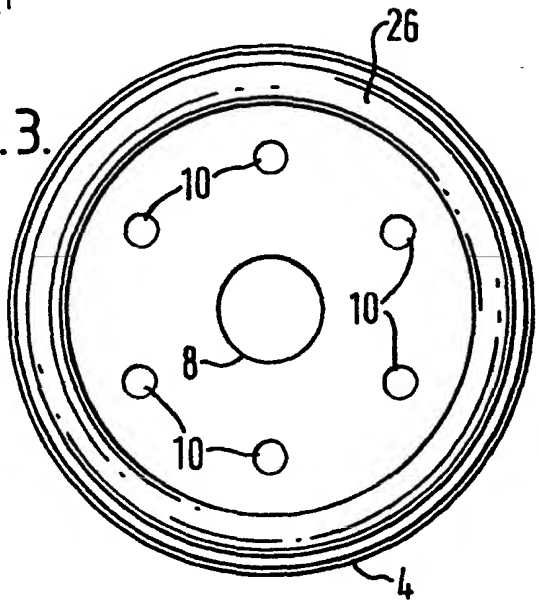


FIG. 3.



SPECIFICATION

Oil filters

This invention relates to oil filters, and particularly, although not exclusively, to oil filters for internal combustion engines.

According to the present invention, there is provided an oil filter comprising a housing made from thermoplastics material within which is disposed a filter element, the housing being provided with oil inlet and outlet means whereby the filter provides an oil flow path extending through the inlet means, across the filter element and through the outlet means.

The housing may be formed from a cylindrical casing having one end open and an end cap for closing the open end of the casing. To assemble the filter, the filter element, and any other internal components of the filter, are placed in the casing and the end cap is then secured to the casing by, for example, friction welding or ultrasonic welding.

The housing may have a screwthreaded socket so that the filter can be fitted to a screwthreaded spigot, on, for example, an internal combustion engine, in which case the housing may also be provided with means for receiving a spanner or other tool to assist in unscrewing the filter from the spigot. This means may be constructed to be effective only in the unscrewing direction, in order to avoid damage to the filter which could arise from overtightening. The screwthreaded socket may comprise the oil outlet means, the spigot then having an axial passageway to receive the oil.

The filter may include a bypass valve to enable oil to flow through the filter even when the filter element is blocked and offers excessive resistance to flow. The filter may also include a pressure switch for providing a signal when the pressure within the filter rises to a value corresponding to that at which the bypass valve opens. The pressure switch may be moulded into the housing.

For a better understanding of the present invention and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a sectional view of an oil filter;

Figure 2 shows, on an enlarged scale, a detail of Fig. 1; and

Figure 3 is a view in the direction of the arrow III in Fig. 1.

The filter comprises a housing made up of a casing 2 and an end cap 4. These two parts are welded together at 6 to form a substantially closed chamber.

The end cap 4 has a central screwthreaded opening 8 and several smaller holes 10, arranged on a circle centred on the axis of the opening 8. Inside the housing ther is a filter element 12 disposed between a support 14 of a bypass valve 16 and a shoulder of a distance piece 18. Beneath th distance piece there is a gasket 20 which covers the holes 10. A spring washer 22 acts b tween th shoulder on the distance piece 18 and the gasket 20.

A hexagonal nut 24 is moulded integrally with the casing 2. It is convenient for the nut 24 to be a 14 millimetre nut so that it can be turned by a standard spark plug spanner. A pressure switch (not shown) may be encapsulated in the nut 24 and separated from the interior of the casing 2 by a membrane of the material from which the casing 2 is made.

The end cap 4 has a circular rib 26, but it could alternatively have a circular groove for receiving a sealing ring.

The filter described above is intended for use on motor vehicle internal combustion engines having a threaded spigot which can engage the screwthreaded opening 8. To fit the filter to the engine, the entire filter is rotated by hand to screw the filter onto the spigot. This brings the circular rib 26 into contact with a surface on the engine to provide an oil seal. One or more oil outlet ports on the engine will then open into the annular cavity left between the rib 26 and the opening 8, so that oil can flow from the outlet port on the engine into the filter through the holes 10. Since the oil in the engine is under pressure, it can lift the gasket 20 against the action of the spring 22. The filter element 12 and the bypass valve 16 divide the interior of the housing into outer and inner parts. Oil flowing through the holes 10 enters the outer part, and it can reach the inner part only by passing through the filter element 12 or through the by-pass valve 16. From the inner part, the oil can return to the engine through an axial passageway in the spigot which is received in the opening 8.

Normally, all of the oil will flow through the filter element 12. However, the pores of the filter element 12 will progressively become blocked until the pressure in the outer part of the interior of the housing is sufficiently high to open the by-pass valve 16. The pressure switch moulded into the casing 2 is calibrated to provide a signal when the pressure in the outer part of the chamber approaches the level at which the by-pass valve 16 will open. This signal may be a light on the vehicle dashboard and provides an indication that the oil filter is due for replacement. The pressure at which the switch will operate will depend on the thickness of the membrane separating the switch from th interior of the casing 2, and this provides one method of calibrating the switch.

The casing 2, the end cap 4, the support 14, the body of the by-pass valv 16 and the distance piec 18 are moulded from thermoplastics material such as nyl n. This results in a considerable cost saving compared with th

manufacture f the same parts from metal, as is conventional. To assemble the filter, the internal components are placed insid the casing 2, and the end cap 4 is then welded to the casing 2, for example by spin welding (i.e. by placing the end cap 4 on the casing and rotating it to generate heat by friction which melts the thermoplastic material) or, more preferably, by ultrasonic welding.

Another advantage arising from the use of thermoplastic material is that refinements, such as the nut 14 and the pressure switch, can be added at low cost.

Since the screwthread in the opening 8 can easily be damaged by overtightening, it may be desirable for the nut 14 to be replaced by formations on the casing 2 which, when engaged by a tool, are effective to rotate the filter only in the unscrewing direction.

CLAIMS

1. An oil filter comprising a housing made from thermoplastics material within which is disposed a filter element, the housing being provided with inlet and outlet means whereby the filter provides an oil flow path extending through the inlet means, across the filter element and through the outlet means.

2. An oil filter as claimed in claim 1, in which the housing comprises a cylindrical casing having an end wall at one axial end, the other axial end being closed by an end cap.

3. An oil filter as claimed in claim 2, in which the casing and the end cap are fixed together by welding.

4. An oil filter as claimed in any one of the preceding claims, in which the housing has a screwthreaded socket for cooperation with a screwthreaded spigot on machinery to which the filter is to be fitted, thereby to retain the filter on the machinery.

5. An oil filter as claimed in claim 4, in which the housing is provided with a non-circular projection for receiving a tool to rotate the filter to unscrew it from machinery to which it is fitted.

6. An oil filter as claimed in claim 4, in which the projection is hexagonal.

7. An oil filter as claimed in claim 5 or 6, in which the projection is constructed to be effective only in the unscrewing direction.

8. An oil filter as claimed in any one of the preceding claims, in which a pressure switch is moulded into the housing.

9. An oil filter as claimed in any one of the prededing claims, in which a sealing ring is moulded integrally with the housing.

10. An oil filter as claimed in any on of the preceding claims, in which the thermoplastics material from which th h using is made comprises nylon.

11. An oil filter substantially as described herein with reference to, and as shown in, the accompanying drawings.

12. A method of manufacturing an il filter, th method comprising:

a) forming a cylindrical casing from thermoplastics mat rial, th casing having an end wall at one axial end, the other end being open,

b) forming an end cap from thermoplastics material,

c) placing a filter element within the casing, and

d) placing the end cap over the open end of the casing and fixing the end cap and the casing together by welding.

13. A method as claimed in claim 12, in which the welding step comprises spin welding.

14. A method as claimed in claim 12, in which the welding step comprises ultrasonic welding.

15. A method of manufacturing an oil filter substantially as described herein.

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